The Concept of Rationality in Introductory Economics Textbooks

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Abstract

The paper reviews major Economics textbooks used in the UK from the point of view of their use of rationality as a teaching tool. The textbooks vary widely in their *explicit* analysis of rationality from finding it important to totally ignoring it. When textbooks do use the concept as part of their analysis, the definitions vary considerably. In fact, there are some implicit uses of rationality in all textbooks although these are not always acknowledged. This complexity is reflected in the history of economic thought and modern economic analysis. The future use of rationality as a teaching tool is discussed in the context of current research in economics.

JEL Classification: A22

Keywords

rationality, teaching in economics, introductory economics textbooks

Introduction

Rationality is often seen as crucial to modern economics where profit and utility maximisation are being central to economic analysis. A major question to ask is just how much the idea of rationality is reflected in modern teaching. We will investigate this in the context of *introductory* textbooks to economics, since students have their introduction to basic economics in their first year and their introduction to rationality takes place at the same time. Also, as they progress through their degrees, the amount of time devoted to discussing rationality, as opposed to assuming it, tends to diminish. Discussions of rationality in advanced microeconomics classes are rare whereas the main definitions and justification of rationality tend to take place at the start of the degree.

For the purposes of this paper, we will use five widely available textbooks in the UK (Begg et al., 2014; Lipsey and Chrystal, 2015; Mankiw and Taylor, 2017; Parkin, 2016; Sloman et al., 2018) and one online textbook that has been published as a hard copy (COREECON, 2016). The choice of these textbooks is inevitably arbitrary because of the lack of information on sales and popularity as assigned textbooks. However, all demonstrate longevity, having gone through multiple editions, with all of them being in double figures. Mankiw is a version of the American

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textbook (Mankiw, 2019) which is the bestselling textbook in the US. Sloman, Begg et al. and Parkin all score highly on the OpenSyllabus (2020) count[1] of most popular assigned textbooks in the UK, with Sloman coming top. The CORE textbook is a new, high profile, opensource textbook that has been created in response to criticism of economics textbooks after the 2007 financial crisis and has been adopted by several economics departments.

We will examine the similarities and differences between the textbooks and their treatment of rationality. Contrary to what one might expect, the differences are quite extreme. All of the textbooks either implicitly or explicitly incorporate some notion of rationality but the *type* and *scope* of the rationality varies considerably between authors. The paper will also discuss how much rationality is *necessary* for ideas often presented in first year textbooks. Some textbooks seem to manage quite well with little mention of rationality, while others seem to see it as a central part of economic theory.

What will become clear is that the definition of rationality is complex and this is shared with contemporary economic research and has its roots in the history of economic thought. The differences between the textbooks, to a large extent, reflect this complexity and, as a result, place different emphases on different ideas of rationality. For the purposes of this paper, we will take a broad view of rationality, incorporating all commonly used elements.

Rationality in economic theory

A good place to start would be Sen's (1977) discussion of the role of rationality in economics. He states that rationality is usually given two distinct definitions. The first one is that of maximising one's own self-interest, while the second one is that of consistency in terms of the axioms by which utility/expected utility is defined or of the choices made by individuals. Both definitions seem to have wide currency in economic research, although introductory textbooks prefer the first definition (sometimes excluding the self-interested part). The two definitions are linked together in a logical sense since maximisation is usually assumed to require an ordering of consequences, as defined by the axioms, to function.

Sen argues that the term 'rationality' should be confined to the first definition on the grounds that rationality should be about a person achieving her goals. It makes little sense to say that someone is rational when they are achieving something they don't want, even if they are consistent in doing so. He then defines rationality as a correspondence between the choices that a person makes and the interests the person holds. Sen's preference in defining rationality just as maximisation is a minority position in economics and most theorists would continue to define consistency, as well as maximisation, as rationality.

Another, perhaps more surprising, idea of rationality is that of opportunity cost. This is rarely presented as a concept of rationality but is usually seen as a heuristic for making choices. It involves the comparison between the benefits of one's current choice with the next best alternative. This 'next best' is a normative comparison with all the other alternatives, and the comparison with the current choice, establishes which alternative is the best. As such, contrary to how it is usually seen, it can be interpreted as a type of maximisation and hence rationality. This close link explains why opportunity cost often vanishes in more advanced analysis, since the development of maximisation techniques eliminates the need for opportunity cost.

If we define rationality as maximisation, this is reliant on other, subsidiary, elements such as self- interest and full information. For example, Sen's definition could be seen as slightly problematic in that he takes it as read that self-interest is an integral part of economic rationality, although some economists (e.g. Samuelson, 1993) have stated otherwise. The fact that a debate exists means that, taking a broader view, we should incorporate self-interest as a (possible) component of

rationality in our review. However, it *is* generally accepted that information and processing power both have a role to play in rationality. If one does not have sufficient information or processing power then it is simply not possible for an individual consumer or firm to maximise their profits or utility, although there may be market or evolutionary pressures pushing them to optimality.

Much of modern economic debate has focussed on how to properly model bounded rationality, especially models of the firm (see Conlisk, 1996 for examples) most of which are based around a lack of information or processing power. Furthermore, 'rationality as consistency' has been under attack with many psychologists and economists casting doubt on the descriptive realism of axioms of utility and linking violations of these axioms to bounded rationality (c.f. Starmer, 2000). All of these issues highlight the crucial importance of information and processing power to rationality in either its consistency or maximising forms.

The final aspect of rationality is the link between rationality and welfare economics. Preference has two functions: to inform choice and to allow the measurement of one's own welfare (Sen, 1973). It follows that the usual criterion in economics (and in all the textbooks!) for welfare, Pareto Optimality, is closely connected with preference. If a group of people is in a Pareto-optimal situation then none of them can be made better off without someone being made worse off. 'Better off' and 'worse off' in this situation are defined with relation to the individual's preferences. Hence, one would rationally maximise if one achieved Pareto optimality in terms of one's own welfare.

This follows because it is perfectly possible for a person to prefer to do something (e.g. die heroically in battle, give up one's seat on the bus to a disabled person etc.) which does not increase that person's own welfare. This means that preferences, in this case, do *not* track welfare, especially if one ignores self-interest. One's goals in a particular situation may drive actions that are deliberately aimed at *not* increasing one's welfare. Furthermore, even if one's goals are aligned with welfare maximisation, there may be reasons for why, in the absence of rationality, welfare maximisation may fail such as lack of knowledge or processing power. The implication of this is that rationality is required for Pareto-optimality, and many other welfare measures, to work.[2]

This leads to the issue of rationality as a tool in economics. First of all, 'rationality' is quite often used as a shorthand for either maximisation or consistency in a multitude of economics writings. It is often used as a null hypothesis in experimental economics with which results can be compared. It is the baseline for discussion of alternative theories that are, by implication, 'non-rational'. Even if economic theories are not accepted as being descriptively correct, they are often granted normative force that is, what people *would* choose if they had enough information or processing power. Rationality therefore is deeply engrained in economic thinking.

When we review the textbooks, we will take all of these concepts into account so we can analyse whether they are mentioned and, if they are, how closely they are linked to rationality.

Rationality in the textbooks

We will look at the uses of rationality in textbooks, one author at a time, starting with Mankiw and Taylor (2017). Mankiw and Taylor are consistent users of ideas based around rationality. From the first, introductory, chapter they present optimisation (glossed as 'thinking at the margin' p. 4) as rational. They claim that responding to incentives is a central example of rationality, where one responds to changes in costs and benefits when making a decision. In chapter 3, (p. 32) other aspects, usually thought of as being part of rationality, such as self-interest and full information are mentioned but only as a part of demand theory and they are not linked to rationality. In chapter 5 (p. 79), rationality is given as one of the assumptions of indifference curves, together with monotonicity, utility maximisation and self-interest. Interestingly, this is supplemented by two *axioms* for indifference curves, which define an ordering sufficient for ordinal utility (p. 86), although not

enough to define convex indifference curves. These are not linked to rationality and the fact that the authors have already made some assumptions is not discussed.

Mankiw and Taylor also make use of another rationality idea-that of opportunity cost (p. 4), defining it as the benefit of the next most preferred bundle of goods, although this is not linked up to rationality. There are some criticisms made of rationality in terms of behavioural economics (pp. 11–12) which are expanded upon at length in chapter 12. Rationality is also used in welfare economics, where consumer surplus is explicitly linked to rationality in that buyers are seen as the best judges of their own needs (p. 150).

One of the interesting parts of Mankiw and Taylor's exposition of rationality is their discussion in chapter 2 of methodology. This is mostly an endorsement of empiricism and model testing, with a nod to Popper's ideas on falsification. However, they also introduce the idea of 'rationalism', described as the deduction of conclusions from correct assumptions. However, these 'correct assumptions' seem to rely heavily on rationality when agents make decisions. This means that rationality on the part of the agents is part of the correctness of the assumptions which transmit their truth to the derived conclusions. No reference is given for this idea and it is difficult to trace this idea explicitly anywhere else in the economics literature (with the possible exception of the Austrian school c.f. Von Mises, 1949 in his discussion of 'praxeology' or the logic of action).

Sloman et al.'s (2018) textbook also endorses rationality in economics, which is defined in the first chapter as 'weighing up the benefit of any activity against its opportunity cost so that the decision maker successfully maximises their objective' (p. 11). This is followed by a discussion of opportunity cost and the necessity for making sacrifices when making economic decisions, although, again, this is not linked to rationality. Sloman et al. go further than Mankiw and Taylor in their use of rationality. The equality of marginal cost and marginal benefit is described as being rational in the first (p. 12) and fourth chapters. While there is little on the demand curve being rational (ch. 2), this is made up for in chapter 4, which describes consumers as being rational for getting the best value for money given income (i.e. optimisation). While this section does claim that full information is needed in consumer theory, this is not linked up to rationality. There is no attempt to elucidate the axioms of consumer choice within the textbook. The book also includes a section which discusses behavioural economics (ch. 5 pp. 136–140) in some detail, and, as with Mankiw and Taylor, this is quite extensive.

Sloman et al.'s book also uses rationality in chapter 6 when discussing the theory of the firm, when defining the rational producer and using opportunity costs. This is expanded in chapter 7, when looking at perfect competition, where it is stated that a firm requires perfect information, although this is, again, not directly linked up to rationality. Again, this chapter looks at areas where rationality may fail, such as X-inefficiency (pp. 208–209), although this is treated in much more detail in chapter 9 with topics such as satisficing, heuristics, fairness, asymmetric information and alternative models of the firm. The book also integrates rationality more deeply into welfare economics in chapter 12, where efficiency occurs for an individual when the individual rationally sets marginal benefit to marginal cost. The implication is that social efficiency is achieved by the rational actions of individuals in perfectly competitive markets with no externalities. This ties in with a definition in chapter 4 of 'rational consumer surplus' (p. 108) as the attempt by consumers to maximise consumer surplus.

By contrast with both Sloman et al. and Mankiw and Taylor, Lipsey and Chrystal and the CORE textbook don't *explicitly* use the idea of rationality at all. Instead it is asserted, as fact, in the opening chapters that individuals are self-interested, that they respond to incentives and that they maximise. None of these assertions are explained in terms of rationality. This spreads to subsequent chapters in Lipsey and Chrystal, where consumption is defined by asserting that agents maximise utility (p. 78), while firms maximise profits. Consumer choice is defined in terms of utility which

is roughly equated to 'happiness'. Indifference curves are defined by asserting, as fact, that consumers prefer more to less and that indifference curves are convex. Both Lipsey and Chrystal (p. 10 and other places) and the CORE textbook devote substantial space to opportunity cost.

There is nothing in Lipsey and Chrystal on behavioural economics or indeed other deviations from rationality, although there is some discussion on ideas around happiness, well-being and fairness (p. 71). When discussing welfare economics, it is *assumed* that people maximise their utility and Pareto optimality is introduced as a normative constraint. Efficiency is emphasised instead of rationality. By contrast, the CORE project discusses welfare economics and economic theories of justice from multiple angles, as well as behavioural economics and general criticisms of economics. However, it is noticeable that rationality is never linked up to any of these concerns (Indeed 'rationality', as a word, can be found in neither textbook's index.).

One textbook that also has very little mention of rationality is Parkin (2016), where the word only appears once (p. 47), similarly to Sloman, defining rational choice as a comparison between costs and benefits. Parkin focusses very heavily on the idea of opportunity cost, linking it to rationality as 'costs' in the comparison between costs and benefits. This is continued to provide the marginal costs of making a choice, which are compared with the marginal benefits. Opportunity cost is seen as the foundation of the demand curve (p. 95), to measure the slope of the production possibility frontier (p. 73) and to be equivalent to relative price (p. 94).

Other aspects of rationality such as self-interest are assumed (p. 43) as, implicitly, is full information. On pp. 230–231 there is a short discussion on bounded rationality and 'bounded self-interest' but this is passed over quickly and never referred to again. Utility is discussed in chapter 8 as a foundation of demand theory[3] but its consistency requirements are ignored. Likewise, the consistency requirements for indifference curves in chapter 9 are not discussed. In chapter 5, when discussing efficiency and equity, there is no attempt to tie in any idea of rationality.

The final textbook we shall review will be that by Begg et al. This textbook holds a middle ground between those authors such as Sloman et al. who favour rationality and those such as Lipsey and Chrystal who completely ignore it. In the first chapters of the textbook, Begg et al. describe it as a 'fundamental assumption' (p. 3) of economics. Their definition is also the tightest, incorporating self interest and full information as integral parts of the maximisation process. It is also linked to opportunity cost, responsiveness to incentives and the willingness to pay. There is also a text box (p. 10) on behavioural economics, stating that this constitutes a challenge to ideas on rationality, although this is not taken any further. In chapter 2 this is reinforced by the claim that non-incentive related behaviour is 'background' to incentive related behaviour in economics (p. 28).

Chapter 5, at the start, assumes some rationality ideas when connected to consumer choice but the assumptions of indifference curve analysis such as convexity, completeness etc. are asserted as being plausible rather than using an appeal to rationality (p. 85). Later in the chapter, references to rationality are replaced by maximisation. Beyond this, there are very few mentions of rationality even with respect to welfare economics, although opportunity cost is mentioned a few times.

In summary, there are a wide variety of assumptions made about rationality in these textbooks. The most obvious difference is between Lipsey and Chrystal, together with the CORE project, on one hand and the other textbooks on the other. It is quite obvious that the former have deliberately excluded rationality from discussion in their textbooks and have instead asserted ideas such as maximisation etc. Parkin, while briefly mentioning rationality once, has gone down the same route. It is not clear that this has caused much damage to the exposition, although both Lipsey and Chrystal and Parkin are noticeable in having the least exposition of *problems* with rationality. Indeed, maybe there has been a gain in eliminating assertions of rationality where they are not needed. An example is in the assumptions underlying indifference curves. Mankiw and Taylor include rationality, while Lipsey

and Chrystal do not. However, it is noticeable that, logically, Mankiw and Taylor's other assumptions are sufficient to derive indifference curves and the rationality assumption is superfluous.

Another difference is in the definitions of rationality among those who *do* include rationality in their exposition. Begg et al.'s definition is the most comprehensive, including information and self-interest as rational. Sloman et al., Parkin and Mankiw and Taylor's definitions are restricted to optimisation. However, all the authors do, at various points, mention information and self-interest without incorporating them into rationality. Opportunity cost is mentioned in all the textbooks although it is only explicitly linked with rationality by Sloman et al. (p. 11) and Parkin. It is noticeable that the most casual definition of opportunity cost is made by Lipsey and Chrystal (p. 10).[4]

The fact that opportunity cost is linked up to optimisation has some interesting implications. First of all, some of the applications of opportunity cost in the textbooks are simply wrong. Begg et al., for instance, state that the slopes of the production possibility frontier and the budget line are characterised by opportunity cost (ps. 12, 91). However, this is misleading: neither concept includes any notion of preference and so their slopes cannot be equated with the opportunity cost. The slopes can only be interpreted in this way if we combine the two concepts with indifference curves or social welfare functions that *do* include a notion of preference.[5] Secondly, we can see that both the CORE textbook and Lipsey and Chrystal *do* incorporate a notion of rationality, even though they never explain it, through their use of opportunity cost.[6] The same could be seen to a much broader extent with Parkin.

Even if we cast aside the link between opportunity cost and rationality, the fact that all the textbooks use utilities and, occasionally, expected utilities suggests that they *implicitly* accept the consistency of utility, especially as there is no other way, such as empirical evidence, presented to justify it to the reader. Utility is founded on axioms of consistency and so is simply an extension of the idea of consistency as rationality. In fact, as we will see, the axioms of utility and expected utility have, historically, been seen as assumptions of rationality. Having said this, there is little sense that rationality is incorporated in the textbook presentations of the axioms of ordinal or von Neumann-Morgenstern utility. Indeed, it is notable that Mankiw and Taylor suggest that rationality is itself an axiom of indifference curves, ignoring the fact that *all* the axioms could be seen as rational. Utility is seen as being apart from rationality and, instead of being a measure of rational preferences, is often, inaccurately, equated with happiness (c.f. Begg et al., p. 85; Lipsey and Chrystal, p. 71). This latter is an old fallacy: utility is a measure of *preference*, not happiness, and it is perfectly possible for a person to prefer something that will make them less happy.

The differences in this section are serious because they suggest that some of these authors are wrong. Rationality is either important in economics as Begg et al. insist or it is safely ignored as the CORE project does. Even if it is not important in positive economics, that does not mean that it is unimportant in normative that is, welfare economics. Also, one has to decide whether rationality consists of just maximisation as stated by Sloman et al. or it consists of maximisation plus self interest and full information as asserted by Begg et al. We should also ask whether the ignoring of 'axiomatic' definitions of rationality is justified. In all these cases, we have differences of ideas and, if these differences are meaningful, we must choose which idea is correct.

Why are we in this complicated situation with respect to rationality in textbooks?

It can be seen, from the preceding discussion, that there is little consistency in discussion of rationality between the five textbooks. All the books contradict each other, in one respect or another, and the status of rationality in introductory teaching is highly complex. It may be useful to take a step back to understand how introductory teaching ended up in this situation. The notion of rationality

is still quite widespread in economic discussion and is used regularly, if perhaps casually, by most economists. Secondly, the aforementioned complexity reflects, to a certain extent, the current situation in economics. Rationality *is* used in both maximisation and consistency senses, its implicit use in welfare economics is often ignored and the requirements of processing power and full information are often used inconsistently. In that sense, a study of rationality in introductory teaching conflates with the study of rationality in economics as a whole.

The first sense of rationality is optimisation, which has a long pedigree, dating back to the marginalists at the end of the 19th century. In terms of textbooks, it can be seen to date back to Alfred Marshall's seminal textbook (Marshall, 1895: 75–90). Marshall does not refer to rationality per se but his discussion of 'deliberate' action and 'calculation' are an obvious substitute for the idea of rationality. In the text it states that economics should study that area of society which is geared towards the making of money and which can be put most solidly on the grounds of 'calculation' where individuals try to acquire their most preferred outcome. This relates to Begg et al.'s claim that non-incentive related behaviour is background to incentive related behaviour.

Furthermore, it is obvious in his mathematical appendix that Marshall's economics is heavily based around optimisation and that this is directly connected to his notion of calculating human beings. Marshall did not believe that humans were *universally* rational and he was not, in this sense, an 'economics imperialist'. It was precisely the fact that economics was restricted in scope that allowed Marshall to abstract from other human attitudes, not that these attitudes didn't exist.

Since then, Marshall's careful attitude towards delineating the boundaries of economics has been largely ignored and economic reasoning has been applied across the board in many areas previously reserved for other social sciences. (A classic example of this is the work of Gary Becker (c.f. Becker, 1991 [1981])). Indeed, from the start of the neoclassical school, the idea of a special state of 'calculation' or 'deliberation' as opposed to non-deliberative behaviour was ignored, particularly by Edgeworth (1881) who, based on analogies with physics, simply *assumed* that individuals maximised utility. In that sense, the approach of Lipsey and Chrystal and the CORE textbook has a long history.

The second notion of rationality as consistent choice also has a long history and is intimately linked in with the idea of axiomatisation in economics. The first axiomatisation of utility was carried out by Frisch in the 1920s (Frisch, 1926), while the development of the subjective notion of probability was carried out by Ramsey (1926) and De Finetti (1964). It was only with von Neumann and Morgenstern's work on choice under risk and game theory (Von Neumann and Morgenstern, 1953) that these two ideas were brought together with further development of axioms, jointly for both probability and utility, being put together by Savage (1954).

Over time, economists have tried to justify utility and expected utility as being rational independently of whether individuals are maximising or not since maximisation *per se* provides no justification for the measure of preferences used. This approach first comes from the attempts by De Finetti and Ramsey to justify subjective probability, as a measure of belief, by using the Dutch Book argument (De Finetti, 1964). According to this argument, if one's beliefs were not consistent with the axioms of probability then one could have series of bets made against oneself, a Dutch book, that would result in one consistently losing money overall. A Dutch book could be made for each of the axioms of probability and as a result, one could derive these axioms by looking at behaviour that avoided the book.

This notion of rational axioms for action was extended to utility theory by Von Neumann and Morgenstern and expected utility theory by Savage (1954), although no attempt was made to demonstrate a Dutch book that would reinforce these axioms. Instead, the axioms were justified by appeal to older notions of rational choice and the mathematical notion of axioms as enabling logical consistency (see Mirowski, 2002, for a discussion on this and Samuelson, 1952, for

contemporary discussion on the axioms). Since then, expected utility has become the normative standard of rationality in much of modern economics.

The notion of opportunity cost was developed earlier, and separately, by Green (1894) in the context of disagreements between the marginalist school of Marshall and the Austrians about labour value. While Marshall argued that labour could be valued as the disutility of labour, the Austrians saw the only source of value as being in consumption and 'exchange value'. Hence labour was only valued via its effect on wages and consumption so that wages were simply an exchange value. While acknowledging the point about disutility of labour, Green defended and expanded this idea – in the guise of opportunity cost – to other areas of economics such as capital and rent. Green, therefore, was the first to name and systematise the concept, although it could be traced back to the Classical Economists. Green was also the first to argue that opportunity cost was 'reasonable' and because opportunity cost gave better results to the individual using it, that it was rational.

The notion of rationality therefore has multiple sources in the intellectual history of economics. While the maximisation idea was there from the beginning of neoclassical economics, from the start its status as 'rational' has had varying amounts of emphasis. The consistency idea in economics originated from philosophy and the foundations of statistics, where the emphasis was in justifying the foundations of probability. This then spread to utility and to expected utility so that axiomatisation and rationality were seen as two sides of the same coin. Finally, opportunity cost was introduced in a separate tradition in economics and, although it has been used in rationality arguments, it has rarely been discussed, as such, in detail.

From an historical point of view, it may not be surprising that we have such a wide variety of understandings of rationality within introductory economics teaching. When faced with giving a consistent story, the textbook authors have multiple pathways down which they can go with intellectual backing for each path. Unsurprisingly, the consistency interpretation of rationality has largely been ignored in the textbooks, at least in explicit form, and, when it is used, it is usually hidden behind the notion of utility. This is not surprising, given the mathematical complexity behind the idea. Conversely, the prominence of the maximisation idea is not surprising given its intuitive strength. Rather surprising is the lack of acknowledgement of the idea of opportunity cost as a rationality concept, even though it is used as a normative test for making decisions.

Economic rationality in teaching

A crucial question about economic rationality is whether economics lecturers should teach it in their first year modules. Is there any way that we can adjudicate between the different ideas of rationality in the textbooks? Unfortunately, there are arguments that can be put for a wide range of views. It is fairly reasonable to state that rationality as consistency cannot really be introduced into an introductory economics module. The arguments involved are far too mathematical, from the point of view of non-mathematical students, for introductory economics and it is unlikely that people who are new to economics will understand why it is important. If utility needs to be introduced into introductory economics[7] then it should simply be introduced as a measure of preference rather than of *rational* preference as is currently the case.

Aside from this, there is still a decision to be made: either base the introductory courses around rationality as maximisation or eliminate rationality and keep optimisation, self-interest and full information as basic assumptions. There are strong reasons for both courses of action. The exclusion of rationality means that we can eliminate a confusing normative restriction on positive economics that is not necessary for most theories in economics. If we state that maximising utility or maximising profits are theoretical *assumptions* then this treats economics as a scientific enterprise

that could allow for falsification. By contrast, inclusion of rationality gives extra-empirical reasons for accepting these assumptions even though they may not be validated by the facts. By claiming that a course of action is rational, one is supplying reasons for why the agent may choose it, even if there is no evidence that he/she actually does so. Excluding rationality makes economics look more scientific and less messy. This would dispose, among other things, of Mankiw and Taylor's arguments about 'rationalism' as a mode of inquiry.

However, there are also good reasons for including rationality in our teaching. One is that the idea of rationality is still used in advanced economics teaching and research. To not teach it would be to deprive trainee future economists of a widely used concept. Secondly, rationality is wider than pure maximisation since it also includes all the preconditions for successful maximisation such as information and processing power. To think about these aspects of rationality properly, we need to see them as part of a wider system that includes maximisation. Thirdly, we can see that a wider concept of rationality allows us to criticise the neoclassical version in favour of other ideas such as the notion of bounded rationality. Rationality acts as a benchmark from which any alternative can be compared.

Fourthly, it is dubious as to whether the lack of rationality in Lipsey and Chrystal and the CORE textbook is logically coherent. As we discussed previously, the analysis of welfare economics requires some notion of rationality for it to be made coherent. Without rationality, there is no reason for the individual (and by extension the economic modeller) to regard an increase in welfare as worthwhile. Linked to this is the role of self-interest in introductory texts, which, as part of rationality, has a crucial role in linking together welfare with decision-making.

These reasons, however, are double-edged. Self-interest, for example, may be important in supporting conventional welfare economics. However, including it as part of rationality runs the risk of supporting one side in two very much live debates. One is the scope of non-self-interested motives in economics. With the rise of experimental economics, it has increasingly been shown that reciprocity, altruism and culture have a decisive impact on people's decisions (e.g. Fehr and Fischbacher, 2002). The second is that conventional welfare economics has been challenged by many people (c.f. Sen, 1977) who oppose the narrowness of the self-interest assumption in welfare economics and wish to expand the scope of theories of justice in economics.

Secondly, the idea of rationality is defined in different ways, not just in introductory textbooks but also in economics research, with a whole host of different definitions, many of which do not include all its attributes. If the textbooks do not promote a uniform definition then this complexity is made worse. Finally, again by promoting rationality, we seem to be again coming down on one side of an active debate between those who defend rationality as a good approximation of real life and those who see it as being seriously deficient. Naturally, this could be extended to those textbooks which don't use rationality but who do promote utility maximisation as independent hypotheses.

From a teaching point of view, all of these views are important. Lecturers have a duty to students to teach about a concept that is widespread within economics and has logical links with other important areas. However, the use of a normative rule, such as rationality, risks justifying the unjustifiable and keeping in place ideas, such as full information and self-interest, that are being heavily modified by current research.

Conclusion

It is hard to come to a conclusion about the status of rationality in economics teaching. With such a wide range of practices, it is virtually impossible to adjudicate between them. However, in the long run, there do seem to be serious methodological issues with the continuing use of the idea of

rationality in teaching. It confuses the issue between scientific investigation and normative judgements, it tends to favour one side over another in ongoing debates and there is increasing evidence against many of its assumptions.

One could also look to the future. Given that so many of its conclusions are being contradicted by the evidence, it would seem that there is a strong empirical case to abandon rationality in economics research and teaching. If the current trend of research continues then the teaching of rationality in economics will come to seem archaic, supporting descriptive and normative ideas that have been superseded by more modern research. There is the possibility that rationality will eventually become redundant.

Even if one discounts the empirical evidence against 'descriptive' rationality, there is still a need to simplify and unify the current accounts of rationality in first year textbooks. In many cases, various different forms of rationality are being taught in an overlapping fashion, with for example (as in Sloman et al. and Parkin), opportunity cost being part of the definition of rationality-as-maximisation. There is a strong argument in a beginners' course for simplifying the discussion and keeping to the minimum of ideas about rationality.

Maybe the best course of action, when it comes to rationality in the teaching of economics, is one of gradual retreat. As has been demonstrated by the CORE project, it is possible to teach economics without using ideas of rationality and so it is possible to pull back from those areas where rationality acts as a supernumerary assumption. When one does teach rationality, then one should be very careful what is taught. For introductory economics, teaching consistency requirements probably aren't necessary and there may be an argument for not teaching opportunity cost at all. If one does teach rationality then one needs to be comprehensive and include all the preconditions such as full information and self-interest. Finally, one needs an honest appraisal of where rationality assumptions fail. Otherwise, one will not be honestly explaining how economists approach the issue.

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Notes

1. The OpenSyllabus project has problems in that it relies on machine analysis of website resources and so may miss out on websites that do not list textbooks. Furthermore, it seems to count textbooks indiscriminately so some of its outputs seem to be very dated.
2. It should also be pointed out that, insofar as preferences need to be 'well-behaved' or need to conform to utility functions, consistency rationality needs to hold as well.
3. Interestingly, Mankiw seems to have no less than four foundations for demand theory – marginal benefit (p. 96), opportunity cost via the substitution effect (p. 95), marginal utility (pp. 215–225) and indifference curve analysis (p. 247).
4. Lipsey and Chrystal (p. 10) state: ' . . .opportunity cost highlights the choices that must be made by measuring the cost of anything that is chosen in terms of the alternative that could be chosen instead'. The last bit is vague in terms of whether the alternative that could be chosen is the next best or otherwise.

5. Parkin rather loosely characterises opportunity cost as being measured in the context of 'tradeoffs' which could be seen as being based on preferences (p. 71).
6. This, incidentally, is why Lipsey and Chrystal's rather vague characterisation of opportunity cost is problematic in that the role of preference becomes even less clear.
7. Of course, it is possible that many people may decide not to introduce utility into introductory economics at all. One could, for example, skip directly to the demand curve or ordinal preference.

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